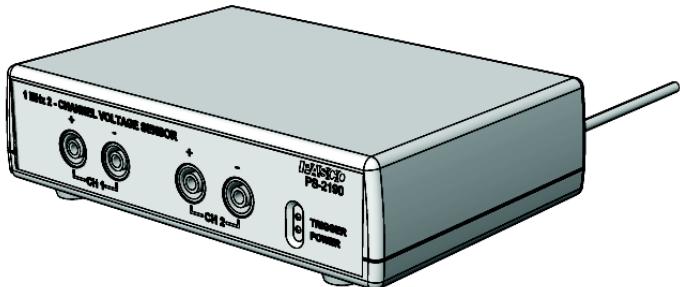


1 MHz 2-channel Voltage Sensor

PS-2190



Included Equipment

- 1 MHz 2-channel Voltage Sensor

Additional Equipment Required

- Xplorer GLX datalogger (PS-2002)
- Patch Cords (SE-9750 or SE-9751)

Quick Start

1. Connect the 1 MHz 2-channel Voltage Sensor to your PASPORT Xplorer GLX datalogger.
2. Use patch cords to connect Channel 1 and Channel 2 to the parts of the circuit for which you want to measure the voltage.
3. On the Xplorer GLX, press the start button (▶) to begin recording data.
4. When data recording is done, press the start button again to stop recording data.

The sensor measures up to two voltages simultaneously at speeds up to one million samples per second when used with the GLX in oscilloscope mode.

Introduction

The 1 MHz 2-channel Voltage Sensor is a high speed, two channel PASPORT voltage sensor that has a basic voltage range of ±10 volts. It has amplifiers that allow full-scale input ranges of ±1 volt and ±0.1 volt. The sensor uses an oversampling scheme that allows input sampling at speeds up to one million samples per second.

The 1 MHz 2-channel Voltage Sensor connects to a PASPORT Xplorer GLX datalogger. Measurements are recorded and displayed by the datalogger.

Set-up

Connecting the Sensor to an Xplorer GLX Datalogger

Plug the sensor into any port on the top of the PASPORT Xplorer GLX datalogger. The Xplorer GLX screen will automatically show a Graph display of voltage versus time.

Setting Sensor Parameters

Sample rate, data averaging, and input voltage range are set in the Sensors screen.

- Press the Home button (🏠) to open the Home screen.
- Press F4 (✉) under Sensors in the Home screen to open the Sensors screen.

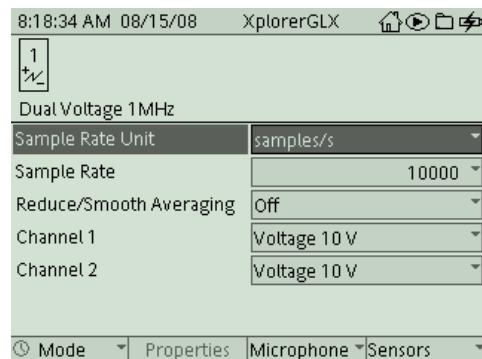


Figure 1: Sensor screen

The Sensors screen shows the icon and name of the sensor in the upper left corner, and menus for Sample Rate Unit, Sample Rate, Reduce/Smooth Averaging, Channel 1, and Channel 2.

Sample Rate in the Sensors Screen

By default, the sensor collects data at 10,000 samples per second. To change the Sample Rate, for example, use the down cursor button (↓) to select the menu. Use the ‘plus’ or ‘minus’ buttons (– +) to increase or decrease the sample rate, or press the check button (✓) to open the menu. Use the up or down cursor buttons to highlight the sample rate and press the check button again to select the choice and exit the menu. The maximum sample rate that can be selected in the Sensors screen is 20,000 Hz. For faster sampling, see “Scope Mode Sample Rate Selection”..

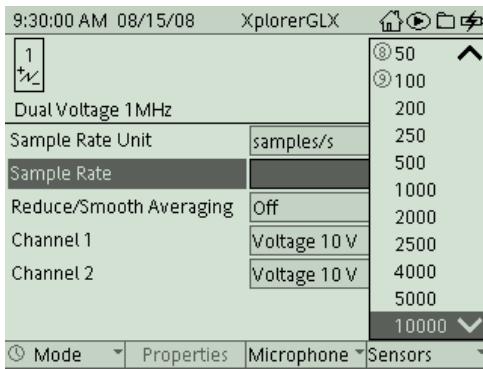


Figure 2: Select sample rate

Selecting Voltage Range

By default, the input voltage range for both channels is ±10 V. To change the input voltage range for either Channel 1 or Channel 2 or to make the channel ‘not visible’, use the up or down cursor buttons to highlight the menu and press the check button (✓) to open the menu. The menu choices are numbered.

Press the number button for the number of your choice to select the choice and close the menu, or use the up or down cursor buttons to highlight your choice and then press the check button to select the choice and close the menu.

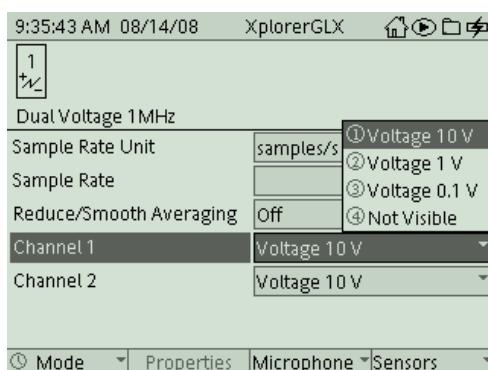


Figure 3: Select input voltage range

The input voltage range for each channel can be set independently.

Selecting Scope Mode

The 1 MHz 2-channel Voltage Sensor is designed to be used with the Xplorer GLX in Scope Mode where the maximum sample rate of 1,000,000 Hz can be selected.

Press the Home button to open the Home screen. Press the F1 button (F1) under ‘Graph’ to open the Graph screen.

Press the F4 button (F4) under ‘Graphs’ to open the menu. The menu choices are numbered. Press the number button of the number of your choice (for example, ‘Scope Mode’), or use the up and down arrow buttons to highlight your choice and then press the check button (✓) to select the choice and close the menu.

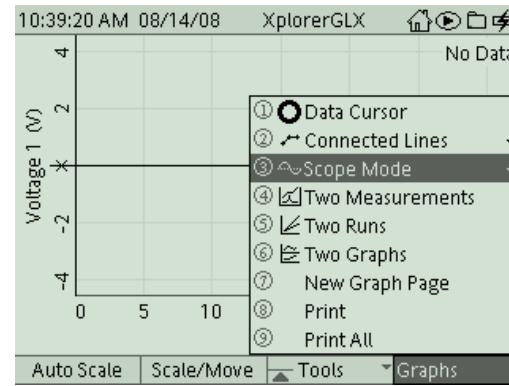


Figure 4: Select Scope Mode

The Graph screen changes slightly -- the ‘zero’ on the vertical axis becomes an ‘x’-- to indicate that the Graph is in the Scope Mode. The ‘Trigger’ choice in the Tools menu is also automatically selected.

Scope Mode Sample Rate Selection

To change the sample rate in Scope Mode, press the F2 (F2) button under ‘Scale/Move’ in the Graph screen. To increase the sample rate, press the right cursor button (⇨). To decrease the sample rate, press the left cursor button (⇦).

As you increase the sample rate by rescaling the Time (s) axis with the ‘Scale/Move’ tool, the units will change from seconds (s) to milliseconds (ms) and -- ultimately -- microseconds (μs).

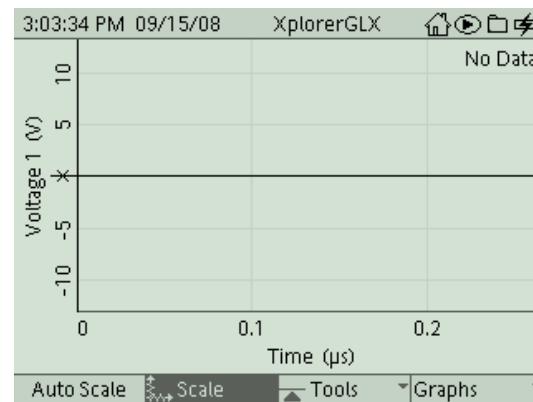


Figure 5: Sample rate in Scope Mode

The sample rate is linked to the time resolution on the horizontal axis. For example, when the horizontal axis scale is 0 to 10 ms, the sample rate in the Sensor Settings screen is 20,000 Hz. When the horizontal scale is 0 to 5 ms, the sample rate is 50,000 Hz. When the horizontal scale is 0 to 2 ms, the sample rate is 100,000 Hz. When the horizontal scale is 0 to 2 μ s, the sample rate is 1,000,000 Hz.

Use of this dynamic sample rate adjustment accomplishes two purposes: It simplifies adjustment of the Graph to obtain a good representation of the input and it allows the sensor to perform averaging of the input signal at lower sample rates and thereby reduce noise that might be part of the signal.

Trigger Settings

The Trigger choice in the ‘Tools’ menu is automatically selected when you select Scope Mode. Press the F3 () button to open the Tools menu. The Trigger is a tool that allows you to control how the GLX collects data. With the Trigger, you make the GLX delay data recording (after you press) until a certain condition is met by the incoming data. The Trigger has two parameters: Trigger Edge, which can be ‘Rising’ or ‘Falling’, and Trigger Level, which specifies the data value that must be crossed. Press the left arrow cursor button () to open the Trigger Settings dialog box (you can also select it from the Tools menu). By default, the Trigger is ‘Disabled’, the Trigger Edge is ‘Rising’, the Trigger Level is ‘0.00’ and the Stop Condition is ‘Off’.

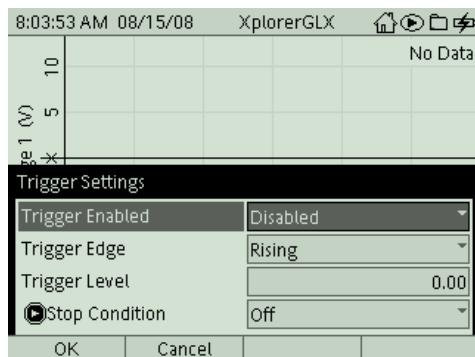


Figure 6: Trigger Settings

Use the up or down cursor buttons to highlight your choice and then press the check button () to change the selection (e.g., from ‘Disabled’ to ‘Enabled’). When the Trigger is ‘Enabled’, an arrow appears along the vertical axis at the Trigger Level. For Trigger Level, press the check button to highlight the numeric value and use the alphanumeric key pad to enter a new value and then press again. Press the F1 () button to select ‘OK’ or the F2 () button to select ‘Cancel’.

Trigger in the Graph Display

The Trigger can be used in normal graph mode to start continuous recording, or it can be used in Scope Mode to repeatedly trigger bursts of data collection. In both modes, the Graph must have time on the horizontal axis.

Use the up arrow cursor button to increase the Trigger Level. Use the down arrow cursor button to decrease the Trigger Level. A horizontal dashed line appears on the graph indicating the Trigger Level.

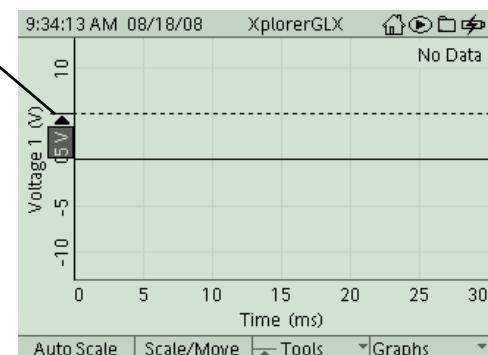


Figure 7: Trigger Level

Press the right arrow cursor button to cycle through ‘Rising’ edge, ‘Falling’ edge, and ‘Disabled’

Stop Condition

When the Stop Condition is turned on, data collection stops automatically when the GLX reaches the right-hand edge of the Graph. To turn on the Stop Condition in the Trigger Settings screen, use the arrow cursor buttons to highlight Stop Condition and press . When the Stop Condition is on, an icon and a vertical dashed line appear on the Graph indicating the stop time.

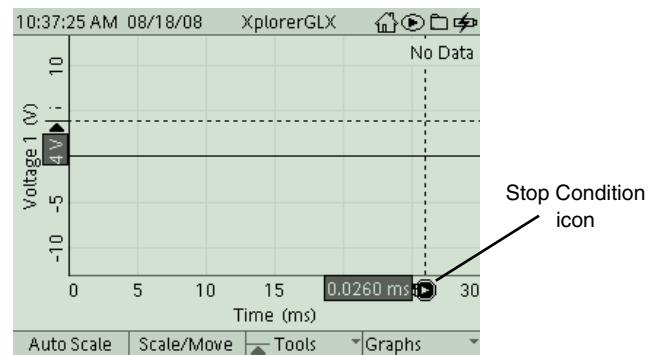


Figure 8: Stop Condition

While viewing the Graph, hold and press the left and right cursor arrow buttons to adjust the stop time. The amount of data collected is determined by the Graph’s time scale.

About the Sensor

Front Panel Indicators

The front panel has two light-emitting diode (LED) indicators. The green LED indicates ‘power on’ when the sensor is connected to the Xplorer GLX datalogger. The yellow LED lights whenever the sensor detects a signal that meets the trigger requirements set up in the GLX.

Trigger In-Out

The PS-2190 has two BNC connectors on the rear panel labeled Trigger In and Trigger Out. By connecting the Trigger Out of one PS-2190 to the Trigger In of a second PS-2190, the two sensors are time synchronized and four channels can be measured. Since the Xplorer GLX can currently only display two channels in Scope Mode, this feature is for future use.



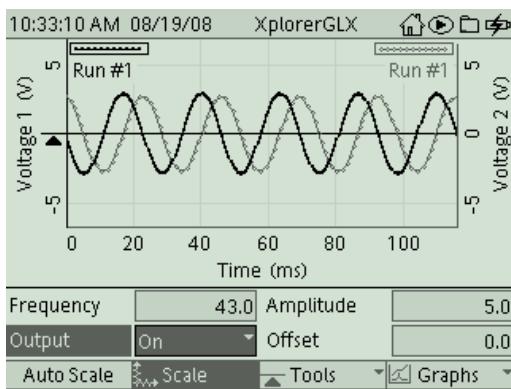
Figure 8: Rear Panel

Basic Specifications

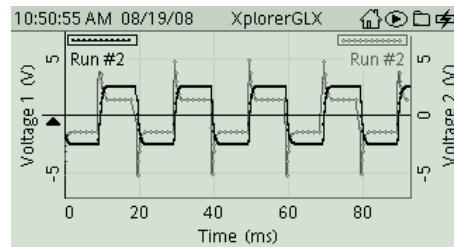
Channels	two, differential
Maximum Sample Rate (Burst Mode)	1 million samples per second
Maximum Sample Rate (Continuous Mode)	20,000 sample per second
Input Voltage Ranges	± 10 V, ± 1 V, ± 0.1 V full scale
Resolution	12-bit analog-to-digital converter, 5 mV at ± 10 volts
Analog Bandwidth	120 kiloHz (-1 dB) typical
Absolute Maximum Input Voltage Without Damage	45 volts

Suggestions

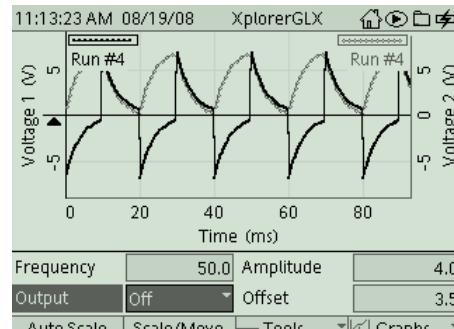
- Measure the voltage of a resistor-inductor-capacitor (RLC) circuit as an input AC voltage sine waveform ranges from below resonant frequency to above resonant frequency.
- Measure the voltage of a resistor-inductor (RL) circuit with an input AC voltage square waveform at 50 Hz.
- Measure the voltage of a resistor-capacitor (RC) circuit as the capacitor charges and discharges through the resistor.



RLC Circuit



RL Circuit



RC Circuit

Technical Support

For assistance with any PASCO product, contact PASCO at:

Address: PASCO scientific
10101 Foothills Blvd.
Roseville, CA 95747-7100

Phone: +1 916-786-3800
(worldwide)
800-772-8700 (U.S.)

Fax: (916) 786-7565

Web: www.pasco.com

E-mail: support@pasco.com

For more information about the 1 MHz 2-channel Voltage Sensor and the latest revision of this Instruction Sheet, visit:

www.pasco.com/go?PS-2190

Limited Warranty For a description of the product warranty, see the PASCO catalog. **Copyright** The PASCO scientific 012-10253A 1 MHz 2-channel Voltage Sensor Instruction Sheet is copyrighted with all rights reserved. Permission is granted to non-profit educational institutions for reproduction of any part of this manual, providing the reproductions are used only in their laboratories and classrooms, and are not sold for profit. Reproduction under any other circumstances, without the written consent of PASCO scientific, is prohibited. **Trademarks** PASCO, PASCO scientific, DataStudio, and PASPORT are trademarks or registered trademarks of PASCO scientific, in the United States and/or in other countries. All other brands, products, or service names are or may be trademarks or service marks of, and are used to identify, products or services of, their respective owners. For more information visit www.pasco.com/legal.